Pacific Herring Coded Wire Tagging Study: 2004 Releases and Recoveries

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V9T 6N7

2005

Canadian Technical Report of Fisheries and Aquatic Sciences 2579

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Canadian Technical Report of Fisheries and Aquatic Sciences

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106-00353/

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Fisheries and Aquatic Sciences 2579

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Cat. No. Fs 97-6/2579E ISSN 0706-6457

Correct citation for this publication:

Flostrand, L., and Schweigert, J.F. 2005. Pacific herring coded wire tagging study: 2004 releases and recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2579: 39 p.

TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
LIST OF FIGURES	iv
LIST OF APPENDICES	v
ABSTRACT	vi
RÉSUMÉ	vii
INTRODUCTION	1
METHODS	2
TAGGING AND RELEASING HERRING	2
RECOVERING TAGS FROM 2004 ROE HERRING CATCHES	2
TAG RECOVERIES AND RECOVERY RATES	3
TAG REMOVALS AND REMOVAL RATES	4
RESULTS	4
TAGGING AND RELEASING HERRING	4
RECOVERING TAGS FROM 2004 ROE HERRING CATCHES	5
TAG RECOVERIES AND RECOVERY RATES	5
TAG REMOVALS AND REMOVAL RATES	9
DISCUSSION	9
ACKNOWLEDGEMENTS	11
REFERENCES	11
TABLES	12
FIGURES	25
APPENDICES	31

LIST OF TABLES

		Page
1	Summary of 2004 tag recoveries by stock assessment region, fishing gear, statistical area, fish plant of recovery, catch searched for tags, total roe fishery catch, percent of total catch searched and tag release year.	12
2	Summary of 2004 CWT recoveries by stock assessment region, statistical area and fishing gear relative to releases. Total catch, catch tonnage searched and the percentage of catch searched are also shown.	14
3	Estimates of 2004 CWT recovery rates (percentage of the released tags recovered) by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.	16
4	Estimates of 2004 tag densities (CWTs recovered per tonne of roe herring searched) by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.	18
5	Estimates of 2004 CWT removals by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.	20
6	Estimates of 2004 CWT removal rates (percentage of the released tag removed) from all roe herring catches by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage and the percentage of catch searched are also shown.	22

LIST OF FIGURES

1	The coast of British Columbia, shown divided into representative fisheries statistical (management) areas.	25
2	Tag releases by location and set number in the west coast of Vancouver Island in 2004.	27
3	Tag releases by location and set number in the Central Coast in 2004.	29

LIST OF APPENDICES

		Page
A	Summary of fishing information related to herring tagging sessions conducted in 2004.	31
B	Summary of 1999 to 2004 herring releases with binary tag code discrepancies and subsequent 2004 tag recoveries.	32
C	Summary of herring CWT releases from 1999 to 2004 by set identification code (year and set number), stock assessment region, statistical area, location, date, code discrepancy (Disc), number of tagged herring released and subsequent 2004 tag recoveries.	33
D	Summary of herring CWT 2003 releases by set identification (year and set number), stock assessment region, statistical area, location, interval sequence number, number of tagged herring released, subsequent 2004 tag recoveries and recovery rate (RR%).	37

ABSTRACT

Flostrand, L., and Schweigert, J.F. 2005. Pacific herring coded wire tagging study: 2004 releases and recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2579: 39 p.

The results from tagging sexually mature Pacific herring in British Columbia during March and April of 2004 and searching commercial roe herring catches in 2004 to recover tags are presented. A total of 357,346 herring were tagged and released, of which 134,644 were from Areas 23 to 26 in the west coast of Vancouver Island and 222,702 were from Areas 6 to 9 in the Central Coast. It was estimated that 25.8% of the total British Columbia roe herring catch by weight, equivalent to approximately 6,134 metric tonnes, was searched for coded wire tags at three fish processing plants. Among the 4 stock assessment regions which had openings for roe herring, the percentages of regional catches searched for tags varied from 14 to 40%. A total of 1,252 tagged herring from six release years were recovered. With respect to year of release, there were 4 recoveries from 1999; 1 from either 1999 or 2000; 34 from 2000; 144 from 2001; 421 from 2002; 628 from 2003 and 20 from 2004. Forty-one inter-regional strays were observed: 1 was a 2000 Strait of Georgia release recovered in the Central Coast; 3 were 2001 Prince Rupert District releases recovered in the Central Coast; 1 was a 2001 Strait of Georgia release recovered in the Central Coast; 7 were 2002 Central Coast releases, 3 were recovered in the Prince Rupert District and 4 were recovered in the Strait of Georgia; 8 were 2002 Prince Rupert District releases, 7 were recovered in the Central Coast and 1 was recovered in the west coast of Vancouver Island; 2 were 2002 Strait of Georgia releases recovered in the west coast of Vancouver Island; 5 were 2003 Central Coast releases, 1 was recovered in the Prince Rupert District, 3 were recovered in the Strait of Georgia and 1 was recovered in the west coast of Vancouver Island; 9 were 2003 Prince Rupert District releases recovered in the Central Coast, and 5 were 2003 Strait of Georgia releases recovered in the west coast of Vancouver Island. In addition to regional strays, there were approximately 136 inter-area strays (with the same region of release and recovery) and there were approximately 1075 recoveries having the same area of release and recovery. Observed tag recovery data were related to roe herring catches by region, area(s) and gear type. Using data from specific recovery and release events, we derived estimates for the number of tagged herring recovered per number released, the number of tagged herring recovered per tonne of roe herring searched, the number of tagged herring removed by the 2004 roe herring fisheries and the number of tagged herring removed per number released.

RÉSUMÉ

Flostrand, L., and Schweigert, J.F. 2005. Pacific herring coded wire tagging study: 2004 releases and recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2579: 39 p.

Nous présentons les résultats du marquage de harengs du Pacifique géniteurs réalisé en mars et en avril 2004 en Colombie-Britannique et de la recherche de poissons marqués parmi les prises commerciales de harengs rogués de 2004. Au total, 357 346 harengs ont été marqués et remis à l'eau, dont 134 644 poissons dans les secteurs 23 à 26 sur la côte Ouest de l'île de Vancouver et 222 702 poissons dans les secteurs 6 à 9 sur la côte Centrale. On estime que 25,8 % (en poids) des prises de harengs rogués effectuées en C.-B., soit approximativement 6 134 tonnes, ont été examinées dans trois usines de transformation du poisson, pour trouver celles qui portaient des micromarques codées. Parmi les quatre régions côtières d'évaluation des stocks où la pêche du hareng rogué a été ouverte, le pourcentage des prises soumises à cette recherche a varié de 14 à 40 %. Au total, 1 252 harengs qui ont été marqués en saison au cours de six années différentes ont été récupérés (4 de 1999, 1 de 1999 ou 2000, 34 de 2000, 144 de 2001, 421 de 2002, 628 de 2003 et 20 de 2004). Quarante et un de ces poissons ont été capturés dans une région différente de celle où ils ont été marqués : 1 a été marqué et remis à l'eau en 2000 dans le détroit de Georgia et recapturé sur la côte centrale, 3 ont été marqués en 2001 dans le district de Prince Ruppert et recapturés sur la côte centrale, 1a été marqué en 2001 dans le détroit de Georgia et recapturé sur la côte centrale, 7 ont été marqués en 2002 sur la côte centrale puis 3 ont été recapturés dans le district de Prince Ruppert et 4 dans le détroit de Georgia, 8 ont été marqués en 2002 dans le district de Prince Ruppert puis 7 ont été recapturés sur la côte centrale et 1 sur la côte Ouest de l'île de Vancouver, 2 ont été marqués en 2002 dans le détroit de Georgia puis recapturé sur la côte Ouest de l'île de Vancouver, 5 ont été marqués en 2003 sur la côte centrale puis 1 recapturé dans le district de Prince Ruppert, 3 dans le détroit de Georgia et 1 sur la côte Ouest de l'île de Vancouver, 9 ont été marqués en 2003 dans le district de Prince Rupert puis recapturés sur la côte centrale et 5 ont été marqués en 2003 dans le détroit de Georgia puis recapturés sur la côte Ouest de l'île de Vancouver. En plus de ces passages d'une région à l'autre, nous avons également observé approximativement 136 passages d'un secteur à l'autre (à l'intérieur d'une même région de marquage et de recapture). Nous avons établi le rapport entre les données de harengs marqués retrouvés et les prises de harengs rogués en fonction de la région, du secteur et de l'engin de pêche utilisé. À l'aide des données obtenues pour les marquages et les recaptures spécifiques, nous avons estimé le rapport du nombre de harengs marqués récupérés au nombre total de harengs marqués, le nombre de harengs marqués récupérés par tonne de harengs examinés, le nombre de harengs marqués capturés lors de la pêche de 2004 et le nombre de harengs marqués capturés par nombre de harengs marqués.

INTRODUCTION

The application of coded wire tags (CWT) in Pacific herring began in 1999 and tag recovery from searching roe herring catches began in 2000. The primary purpose of the multi-year tagging study is to increase understanding of herring stock structure and inter-annual fidelity and dispersal to spawning sites. Characterizing spatial and temporal patterns of spawning behaviour is critical to the effective management of the resource.

Pacific Fishery Management Area Regulations of the Canadian Fisheries Act identify 30 statistical (or management) areas along the British Columbia (BC) coast, herein referred to as areas, Figure 1. These areas are used for fishery management, enforcement and catch reporting purposes. Specifically for Pacific herring management and stock assessment purposes, there are five stock assessment regions, numerous area subdivisions, and several subdivisions within each area referred to as herring sections (Rusch and Hamer 2004; Schweigert 2004; Midgley 2003). The five Pacific herring stock assessment regions are comprised of: 1) the Queen Charlotte Islands (QCI), south-east portions of Area 2E; 2) the Prince Rupert District (PRD), Areas 3 to 5; 3) the Central Coast (CC), Area 7 and portions of 6 to 8; 4) the Strait of Georgia (SG), Areas 14 to 19 and portions of 13 and 29, and 5) the west coast of Vancouver Island (WCVI), Areas 23 to 25.

This report summarises results of the 2004 Pacific herring CWT release and recovery work. The objectives of the 2004 CWT study were to tag herring in the WCVI, CC and PRD stock assessment regions and to search representative portions of all roe herring harvests for CWTs by combining search efforts at three Vancouver-Lower Mainland fish processing plants. Unfortunately, no herring were tagged in the PRD due to simultaneous maturation and spawn activity in the PRD and CC in addition to conflicts with fishery timing and unfavourable weather.

Prior to 2004, CWTs were applied in the SG (1999 to 2003), the QCI (1999), the CC (2002 and 2003) and the PRD (2001 to 2003) and searching of roe herring catches for CWTs occurred in 2000 to 2002 (Flostrand and Schweigert 2002, 2003, 2004). Approximately 1,007,383 tags were released from 1999 to 2003 and approximately 2,100 inter-annual and 2,727 in-season tags were recovered from 2000 to 2003 roe herring fisheries combined. Herring recovered in a region different from where they were tagged are referred to as inter-regional strays (or regional strays). With respect to year of recovery, 3 regional strays were observed in 2000, 1 regional stray was observed in 2001, 4 regional strays were observed in 2002 and 41 regional strays were observed in 2003. Herring recovered in an area different from where they were tagged are referred to as inter-area strays (or area strays) but reporting to date has not elaborated on these. In 2000, 21.3% of the coast-wide roe herring harvest, equivalent to 6,222 metric tonnes (mt), was searched for tags; in 2001, 28.8% of the coast-wide roe herring harvest, equivalent to 6,922 mt, was searched for

tags; in 2002, 31.8% of the coast-wide roe herring harvest, equivalent to 8,468 mt, was searched for tags, and in 2003, 24.9% of the coast-wide roe herring harvest, equivalent to 7,172 mt, was searched for tags. More details on the progress of the study can be found in Flostrand and Schweigert (2002, 2003, 2004).

METHODS

TAGGING AND RELEASING HERRING

Tag recovery refers to the collection of tagged fish by searching the catch during the processing of herring roe at fish plants. A release event refers to the collection of tagged herring released in the same year, region and area, with some exceptions relating to Area 14 and 17, year 1999 and 2000 releases when tag codes were accidentally reused (Tables 2 to 6, Appendix B). In 2004, there were 8 different release events; herring were caught, tagged and released in Areas 23 to 26 of the WCVI (Figure 2) and Areas 6 to 9 of the CC (Figure 3). Tagging occurred on 18 different days of a charter which extended from March 3 to April 1, including vessel preparation, travel and weather.

As in 2002 and 2003, tagging was conducted aboard the Ocean Marauder, a 26.5 m long vessel from which table seining deployed a purse seine net of approximately 274 m x 33 m. Tagging equipment and operational methods were essentially the same as in previous years (Flostrand and Schweigert 2002, 2003, 2004). All tag insertions were done into the muscle tissue behind the skull (also referred to as the nape site) and fish were not anaesthetised. Binary and decimal CWT codes were applied and a unique set of tag codes or code sequences was used for each tagging session. As in 2003, unique sets of tag codes were used to differentiate tagging intervals within sessions for assessing potential holding period effects. Seawater was sprayed over and around the release outlet from a power hose to shield tagged herring from predators. The spray has been found to be an effective deterrent against sea birds and a good alternative to a recovery pen used in previous years, which sea lions had a tendency to disturb.

A representative biological sample was collected during each tagging session to collect information on fish age, sex, maturity, length and weight compositions and samples for DNA analysis were also taken from some of the sets. Results of biological samples are not provided in this report.

RECOVERING TAGS FROM 2004 ROE HERRING CATCHES

In 2004, the QCI region was closed for roe herring harvests, therefore CWT recovery effort focussed on searching a representative portion of catch from the PRD, CC, SG and WCVI. The equipment and methods for tag recovery

were the same as for the 2000 to 2003 seasons, using R9500 CWT detectors and deflector gates along a conveyor belt (Flostrand and Schweigert, 2002 2003, 2004). The three fish plants housing the tag recovery equipment in 2003 were also the same as those during the 2001 to 2003 tag recovery seasons, being Icicle Seafoods Inc. (Icicle), Canadian Fishing Company (CFC), and Bella Coola Fisheries Ltd. (Bella Coola). As in 2003, no roe herring seine catch from Sitka, Alaska was searched for tags.

Tag recovery equipment operated from March 29 to June 28 and J.O. Thomas and Associates were again contracted to: operate recovery units; collect and handle samples; record results of equipment operation; verify catch information related to fish lot processing records and communicate processing schedules and equipment needs with plant staff. Roe herring catch records and CWT search data were compiled into a Microsoft Access database, referred to as the Herring Tag Recovery Database (J.O. Thomas and Associates Ltd., 2004). Logbooks were kept to document equipment settings and test trials approximately every hour using seeded specimens to ensure that recovery units were in working order. Records were also kept of conveyor speeds and loading rates (mt/hour). Information pertaining to equipment operation is not presented in this report. Field personnel removed the gill tissue and rinsed each carcass of a putative tagged fish with water to remove possible sources of metal contamination prior to re-testing for the presence of a tag. This was done to reduce the number of false positive recoveries brought to the laboratory for CWT dissection.

TAG RECOVERIES AND RECOVERY RATES

Tag recovery observations were used to calculate tag recovery rates (%) which were determined by relating the number of tags recovered from specific fisheries to the number of tags released from defined 1999 to 2004 release events. Estimates of tag recovery densities were determined by relating the number of tag recoveries from specific fisheries to quantities of roe herring searched (mt). Recovery rates were determined by:

$$RR_o = R_o / T \qquad (1)$$

where

RR_o = observed tag recovery rate;
R_o = observed number of tags recovered by release year, region, and area and by recovery region, area and gear;
T = number of tags released by year, region and area.

Tag (recovery) densities were determined by:

$$RD = R_o / S \qquad (2)$$

where

RD = observed tags recovered per metric tonne of roe herring searched;
S = roe herring catch searched (mt) by region, area and gear.

TAG REMOVALS AND REMOVAL RATES

Tag removal refers to the estimate of the number of tagged herring removed from the population by roe herring fisheries. Estimates of tag removals from 2004 roe herring fisheries were determined by incorporating the proportion of each roe herring fishery's catch searched for tags into the number of recoveries observed, determined by :

$$R' = R_o (C/S) \quad (3)$$

where

R' = estimated number of tags removed;
C = total roe herring catch (mt) by region, area, and gear.

Tag removal rates were calculated by dividing tag removal estimates by the number of tags released from defined release events; thus each rate can be interpreted as a percentage of the released tags removed by each fishery. Estimates of tag removal rates were determined by:

$$RR' = R' / T = RR_o / (S/C) \quad (4)$$

where

RR' = estimated tag removal rate.

RESULTS

TAGGING AND RELEASING HERRING

There were 24 tagging sessions in 2004 and the total number of Pacific herring tagged and released was 357,346 (Figures 2 and 3). Of that total, 134,644 were tagged in the WCVI, comprised of 33,608; 32,421; 41,343 and 27,181 from Areas 23 to 26, respectively (Figure 2). Release events in these areas (sets 1 to 11) preceded or were concurrent with roe herring seine and gillnet fisheries in Area 25. A total of 220,702 herring were tagged in the CC, comprised of 52,049; 107,843; 45,040 and 17,770 from Areas 6 to 9, respectively (Figure 3). Release events in Areas 6 to 8 (sets 12 to 22) preceded or were concurrent with the roe herring seine fishery in Area 7. To reduce chances of in-season tag recoveries and removals, an effort was made to avoid tagging near commercial fishing activities.

Twenty- two of the 24 tagging sessions in 2004 had more than 1 tag interval. Two sessions had 2 intervals, 8 sessions had 3 intervals and 12 sessions had 4 intervals. Collectively, the number of tags in each interval grouping from 1 to 4 was 117,438, 114,535, 88,786 and 36,587, respectively.

RECOVERING TAGS FROM 2004 ROE HERRING CATCHES

The total annual BC catch of roe herring in 2004, including charter vessel payment catches, was 23,788.4 mt (Rusch and Hamer 2004). Roe herring fishery catches and tag recoveries by region, area, gear, and tonnages searched for tags at fish processing plants are summarized in Table 1. Fishery catch dates, areas and amounts caught (including charter payment catches) are as follows: gillnetting in the PRD occurred from March 19 to 25 in Area 4 and 2,192.2 mt were caught; seining in the PRD occurred from March 26 to 30 in Area 5 and 1,908.5 mt were caught; seining in the CC occurred from March 24 to 26 in Area 7 and 2,987.8 mt were caught; gillnetting in the SG occurred from March 10 to 29 in Areas 14 and 17 and 5,226.5 mt were caught; seining in the SG occurred from March 10 to 13 in Area 17 and 7,018.9 mt were caught; gillnetting in the WCVI occurred from March 14 to 17 in Area 25 and 593.3 mt were caught, and seining in the WCVI occurred from March 14 to 16 in Area 25 and 3,861.2 mt were caught. The resolution of 2004 SG gillnet recoveries is to Areas 14 and 17 combined because the fishery enabled catches from these adjacent areas to be mixed.

An estimated 6,134.5 mt of the total BC roe herring catch was searched for CWTs, representing approximately 25.8% of the total catch. Regionally, 14.0% of PRD; 40.5% of CC; 21.7% of SG and 38.1% of WCVI catches were searched for CWTs. Search percentages by region and gear of fishery were as follows: the PRD gillnet was 20.1%; the PRD seine was 6.9%; the CC seine was 40.5%; the SG gillnet was 23.2%; the SG seine was 20.6%; the WCVI gillnet was 14.2% and the WCVI seine was 41.8% (Tables 1 to 6). From the total gillnet catch of 8,012.0 mt, approximately 21.7% was searched and from the total seine catch of 15,776.4 mt, approximately 27.9% was searched. The approximate herring tonnage searched (and % of processed roe herring) at each of the fishing plants was 2,104 (70%) at Bella Coola, 1,805 (90%) at CFC and 2,225 (90%) at Icicle.

TAG RECOVERIES AND RECOVERY RATES

A total of 1,252 tag recoveries with known release and recovery history were obtained from the 2004 CWT search efforts. There were 20 recoveries from 2004 releases; 628 recoveries from 2003 releases; 421 recoveries from 2002 releases; 144 recoveries from 2001 releases; 34 recoveries from 2000 releases; 1 recovery from 1999 or 2000 between-year discrepant code releases, and 4 recoveries from 1999 releases. Table 1 presents all the recoveries by release year, region, gear, area and fish plant of recovery and Table 2 presents

all the recoveries by release year, region, area, total tags released and by recovery region, area, gear, catch total and the amount of catch searched for tags. In addition, 211 herring without tags were collected but found to contain metal contamination (48 BC, 112 CFC and 51 Icicle) and two samples were lost prior to inspection of tag codes.

All 20 of the in-season recoveries were caught in Area 25 of the WCVI. Fifteen of these were released from Area 25 and 5 were from Area 26. Two of the Area 26 releases were recovered by seine and the remainder were gillnetted.

Out of the 628 recoveries from one-year at large 2004 releases, 102 were caught in the PRD; 483 were caught in the CC; 37 were caught in the SG, and 6 were caught in the WCVI. There were 19 inter-regionai strays: 9 were Area 5 releases recovered in Area 7; 5 were Area 7 releases, 1 was recovered in Area 5, 3 were recovered in Areas 14 or 17 and 1 was recovered in Area 25, and there were 5 Area 14 releases recovered in Area 25. From all one-year at large recoveries, 29 were gillnetted and 599 were seined: 19 were from PRD gillnet and 83 were from PRD seine; 483 were from CC seine; 10 were from SG gillnet and 27 were from SG seine; none were from WCVI gillnet and 6 recoveries were from WCVI seine.

Out of the 421 recoveries from two-year at large 2002 releases, 190 were caught in the PRD; 168 were caught in the CC; 60 were caught in the SG, and 3 were caught in the WCVI. There were 17 inter-regional strays: 2 were Area 4 releases, 1 was recovered in Area 7 and 1 was recovered in Area 25; 6 were Area 5 releases recovered in Area 7 (one of these was a Wilson Inlet release); 3 were Area 6 releases, 1 was recovered in Area 4 and 2 in Area 5; 3 were Area 7 releases recovered in either Area 14 or Area 17; 1 was an Area 8 release recovered in Area 17, and 2 were Area 14 releases recovered in Area 25. From all two-year at large recoveries, 187 were gillnetted and 234 were seined. One hundred and fifty-one recoveries were from PRD gillnet and 39 were from PRD seine; 168 were from CC seine; 36 were from SG gillnet and 24 were from SG seine; none were from WCVI gillnet and 2 recoveries were from WCVI seine.

Out of the 144 recoveries from three-year at large 2001 releases, 107 were caught in the PRD; 4 were caught in the CC; 33 were caught in the SG, and none were caught in the WCVI. There were 4 inter-regional strays: 1 was an Area 4 release recovered in Area 7; 2 were Area 5 releases recovered in Area 7, and 1 was an Area 14 release recovered in Area 25. From all two-year at large recoveries, 119 were gillnetted and 25 were seined. Ninety-four recoveries were from PRD gillnet and 13 were from PRD seine; 4 were from CC seine, 25 were from SG gillnet and 8 recoveries were from SG seine.

Out of the 34 recoveries from four-year at large 2000 releases, none were caught in the PRD and WCVI, 1 was caught in the CC and 33 were caught in the SG. There was 1 inter-regional stray from Area 14 to Area 7. From all four-year

at large recoveries, 27 were gillnetted and 7 were seined. One recovery was from CC seine; 27 were from SG gillnet and 6 were from SG seine.

Some of the 1999 and 2000 release events had within-year discrepancies (WYD) because of multiple tag code use between Areas 14 and 17; similarly, some of the 1999 and 2000 release events had between-year discrepancies (BYD) because of accidental repetitive tag code use between years 1999 and 2000 (Tables 2 to 6, Appendix B). There was 1 BYD SG recovery from SG gillnet.

All 4 recoveries from five-year at large 1999 releases were caught in the SG and there were no inter-regional strays. Three of these recoveries were gillnetted and 1 was seined. None of the 1999 releases from the QCI were recovered.

Herring CWT recovery rates and densities with respect to release and recovery events are presented in Tables 3 and 4. Cumulative recovery rates for release events derived from all roe herring fishery sources are described below. In-season recovery rates for Areas 25 and 26 releases were 0.04 and 0.02%, respectively. One-year at large recovery rates for Areas 4 and 5 releases were 0.06 and 0.10%, respectively; for Areas 7 to 9 releases they were 0.55, 0.10 and 0.09%, respectively, and for Areas 14 and 16 releases they were 0.04 and 0%, respectively. Two-year at large recovery rates for Areas 4, 5-north and 5-south (Wilson Inlet) releases were 0.27, 0.20 and 0.10%, respectively; for Areas 6 to 8 releases they were 0.13, 0.44 and 0.07%, respectively, and for Area 14 releases it was 0.07%. The three-year at large recovery rates for Areas 4 and 5 releases were 0.13 and 0.11%, respectively, and the recovery rate for Area 14 releases was 0.06%. Four-year at large recovery rates for Areas 14 and 17 releases ranged from 0.01 to 0.05%, and the recovery rate for the BYD releases was 0.1%. The five year at large recovery rates for Areas 14 and 17 releases ranged from 0 to 0.2%.

Trends in one year at large recovery rates as a function of tag interval sequence within a tag session (related to pre tagging holding period) are briefly summarized below (from Appendix D). There were 3 sessions with only 2 intervals and from these, 1 session showed no decline in recovery rate and 2 sessions showed declines. There were 22 sessions that had 3 or 4 intervals and from these, 8 sessions showed no decline in recovery rate, 8 sessions had sequential declines and 6 sessions had non-sequential declines (where the last interval recovery rate was lower than the first but not lower than any intermediate intervals).

Tag densities for in-season Areas 25 and 26 releases in Area 25 gillnet were 0.178 and 0.036 tags/mt, respectively, and the density for Area 26 releases in Area 25 seine was 0.001 tags/mt.

Tag densities for one-year at large Area 4 releases in Area 4 gillnet and Area 5 seine were 0.011 and 0.030 tags/mt, respectively. Tag densities for 2003 Area 5 releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.032, 0.593 and 0.007 tags/mt, respectively. Tag densities for 2003 Area 7 releases in Area 5 seine, Area 7 seine, Area 17 SG and Areas 14 and 17 gillnet were 0.008, 0.360, 0.001 and 0.002 tags/mt, respectively. The tag density for 2003 Area 8 releases in Area 7 seine was 0.023 tags/mt. Tag densities for 2003 Area 9 releases in Area 7 seine and Area 25 seine were 0.009 and 0.001 tags/mt, respectively. Tag densities for 2003 Area 14 releases in Area 17 seine, Areas 14 and 17 gillnet and Area 25 seine were 0.018, 0.007 and 0.003 tags/mt, respectively.

Tag densities for two-year at large Area 4 releases in Area 4 gillnet, Area 5 seine, Area 7 seine and Area 25 seine were 0.290, 0.023, 0.001 and 0.001 tags/mt, respectively. Tag densities for 2002 Area 5-north releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.043, 0.205 and 0.004 tags/mt. Tag densities for 2002 Area 5-south (Wilson Inlet) releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.007, 0.053 and 0.001 tags/mt, respectively. Tag densities for 2002 Area 6 releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.002, 0.015 and 0.017 tags/mt, respectively. Tag densities for 2003 Area 7 releases in Area 7 seine, Area 17 seine and Areas 14 and 17 gillnet were 0.112, 0.001 and 0.002 tags/mt, respectively. Tag densities for 2002 Area 8 releases in Area 7 seine and Area 17 seine were 0.005 and 0.001 tags/mt, respectively. Tag densities for 2002 Area 14 releases in Area 17 seine, Areas 14 and 17 gillnet and Area 25 seine were 0.015, 0.028 and 0.001 tags/mt, respectively.

Tag densities for thee-year at large Area 4 releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.186, 0.023 and 0.001 tags/mt, respectively. Tag densities for 2001 Area 5 releases in Area 4 gillnet, Area 5 seine and Area 7 seine were 0.027, 0.076 and 0.002 tags/mt. Tag densities for 2001 Area 14 releases in Area 7 seine, Area 17 seine and Areas 14 and 17 gillnet were 0.001, 0.006 and 0.021tags/mt.

Tag densities for four-year at large Area 14 releases in Area 7 seine, Area 17 seine and Areas 14 and 17 gillnet were 0.001, 0.003 and 0.015 tags/mt, respectively. Tag densities for 2000 Area 17 releases in Area 17 seine and Areas 14 and 17 gillnet wee 0.001 and 0.006 tags/mt, respectively. Tag densities for 2000 Areas 14 and 17 WYDs in Area 17 seine and Areas 14 and 17 gillnet were 0.001 and 0.002 tags/mt, respectively.

The tag density for 1999/2000 BYD Areas 14 and 17 releases in Areas 14 and 17 gillnet was 0.001 tags/mt. Five-year at large recoveries for 1999 Area 14 releases in Area 17 seine and Areas 14 and 17 gillnet were 0.001 and 0.002 tags/mt, respectively, and the tag density for 1999 Areas 14 and 17 WYDs releases in Areas 14 and 17 gillnet was 0.001 tags/mt.

TAG REMOVALS AND REMOVAL RATES

Estimates of CWT removals and removal rates by release event and by area and gear of recovery are presented in Tables 5 and 6, respectively. The estimate of the total number of tagged herring removed from the population in the 2004 roe herring fishery is 5,808. Summary estimates of in-season, one-year at large, two-year at large, three-year at large, four-year at large, five-year at large and 1999/2000 BYD tag removals are 131; 2,682; 2,011; 813; 149; 18 and 4, respectively (Table 5). Estimates of tag removal rates by release and recovery event are given in Table 6. In-season removal rates ranged from 0.10 to 0.25%; one-year at large removal rates ranged from 0.019 to 1.38%; two-year at large removal rates ranged from 0.21 to 1.95%; three-year at large removal rates ranged from 0.25 to 0.94%; four-year at large removal rates ranged from 0.05 to 0.21%; five-year at large removal rates ranged from less than 0.01 to 0.07% and the BYD tag removal rate was estimated at 0.06%.

DISCUSSION

In 2004, the total number of Pacific herring tagged and released by 4 tag injectors during 24 sessions was 357,346, which was more releases than any other year of the study. It was the first year herring were tagged in the WCVI and there was relatively wide tagging coverage in both the WCVI and CC because environmental conditions and fish availability were favourable. The mean tagging session duration was 3.5 hours, which was an increase from 2003 partly due to the continued practise of differentiating tagging intervals within each tag session and partially due to taking advantage of calm seas. Because it is often difficult to acquire fish for tagging at desired times and locations, longer tagging sessions were thought to be beneficial. Recovery rate trends from 2003 release intervals showed some declines from increasing tagging session duration but not enough to conclude that longer sessions are ineffective (Appendix D). In addition to effects from varying holding times prior to tagging and releasing fish, inherent variability between sessions from several sources may affect tagging mortality with unknown and confounding effects. Sources of variability between sessions are from uncontrollable factors such as fish density in the seine set, sea state, ambient temperature and catch composition (fish size, age, reproductive state etc).

The estimated 6,134 mt of BC roe herring searched for CWTs was less than previous recovery years, which were as follows: 7,172 mt (2003); 8,468 mt (2002), 6,921 mt (2001) and 6,321 mt (2000; Flostrand and Schweigert 2002, 2003). In 2004, there was relatively high search coverage of CC and WCVI catches but as in 2003, PRD catches were relatively under-represented for searching tags, especially Area 5 seine. The intent to add or move a recovery unit to another fish plant to increase search coverage of PRD catches was not pursued due to funding constraints. It is anticipated that the same three fish plants will be used in the 2005 recovery year. Although the relative proportion of

gillnet catch searched for tags was lower than in previous years, the majority of two-year at large and longer recoveries were from gillnet fisheries. This has been observed in previous recovery years, where gear selectivity appears to have detectable effects on recovery rates (Flostrand and Schweigert 2004, 2003).

The 1,232 inter-annual recoveries in 2004 were the most observed in a recovery year due to effects from cumulative years of tagging. The 2004 recoveries also demonstrated reproductive straying, as evidenced by the 41 inter-regional strays and 136 inter-area strays.

Future work with the Pacific herring tagging study will be focused on analysis of results, model development and obtaining recoveries from the 2005 roe herring season. Tagging is not planned for the 2005 roe herring season to allow time for analysis and program review.

ACKNOWLEDGEMENTS

The Herring Conservation and Research Society in conjunction with DFO provided funding for this work. Sue Lehmann (Habitat Management Division, DFO) provided the loan of two Mark IV tag injectors. Doug Herriott (Salmon Head Recovery Program, DFO) assisted with inventorying and proof reading supplies of CWTs. Streamline Consulting Services (Thyra Nichols and Mary Jane Bilodeaux) provided technical support for tagging fieldwork. Charter boat crew members from the tagging vessel the Ocean Marauder (John Lenic, Harold Tretwold, David Matthews, Mike Relja, Ian Brown and Harley Brown) contributed greatly to the fishing and tagging efforts. Fish plant staff at Canadian Fishing Company Ltd., Icicle Seafoods Inc. and Bella Coola Fisheries Ltd. were again extremely cooperative in accommodating the recovery units and providing herring roe processing reports. Doug Tallman of J.O. Thomas and Associates provided logistical support for recovery operations and supervised the field staff who again diligently collected and managed recovered samples. Christa Hrabok and Peter Midgley assisted with data synthesis.

REFERENCES

Flostrand, L., and Schweigert, J.F. 2002. Pacific herring coded wire tagging study: releases and recoveries, 1999 – 2001. Can. Tech. Rep. Fish. Aquat. Sci. 2428: 34 p.

Flostrand, L., and Schweigert, J.F. 2003. Pacific herring coded wire tagging study: 2002 releases and recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2483: 38 p.

Flostrand, L. and Schweigert, J.F. 2004. Pacific herring coded wire tagging study: 2004 releases and recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2534: 57 p.

Midgley, P. 2003. Definitions and codings of localities, herring sections and stock assessment regions for British Columbia herring data. Can. Manuscr. Rep. Fish. Aquat. Sci. 2634: 113 p.

Rusch, B. and Hamer, L. 2004. A review of 2003 / 2004 British Columbia herring fisheries. Can. Ind. Rep. Fish. Aquat. Sci. 275: vi + 64 p.

Schweigert, J. 2005. Stock assessment for British Columbia herring in 2004 and forecasts of the potential catch in 2005. Can. Science Advisory Secr. Res. Doc. P2004:01.

Table 1. Summary of 2004 tag recoveries by stock assessment region, fishing gear, statistical area, fish plant of recovery, catch searched for tags, total roe fishery catch, percent of total catch searched and tag release year.

Region	Gear	Area	Fish Plant	Catch (mt) Searched	Total Catch (mt)	% Catch Searched	CWT Recoveries by Release Year							
							1999	BYD	2000	2001	2002	2003	2004	All
PRD	GN	4	Bella Coola	212.3	-	-	-	-	-	47	95	9	-	151
			CFC	129.7	-	-	-	-	-	24	27	7	-	58
			Icicle	98.9	-	-	-	-	-	23	29	3	-	55
			All	440.9	2192.2	20.1	-	-	-	94	151	19	-	264
	SN	5	Bella Coola	94.3	-	-	-	-	-	10	30	63	-	103
			CFC	0.0	-	-	-	-	-	-	-	-	-	
			Icicle	37.2	-	-	-	-	-	3	9	20	-	32
			All	131.5	1908.5	6.9	-	-	-	13	39	83	-	135
	Both	4, 5	All	572.4	4100.7	14.0	-	-	-	107	190	102	-	399
CC	SN	7	Bella Coola	470.8	-	-	-	-	-	1	76	233	-	310
			CFC	315.7	-	-	-	-	1	3	43	133	-	180
			Icicle	422.8	-	-	-	-	-	-	49	117	-	166
			All	1,209.3	2987.8	40.5	-	-	1	4	168	483	-	656
SG	GN*	14, 17	Bella Coola	99.8	-	-	-	1	1	2	2	-	-	6
			CFC	503.5	-	-	2	-	13	11	20	3	-	49
			Icicle	606.9	-	-	1	-	13	12	14	7	-	47
			All	1,210.2	5226.5	23.2	3	1	27	25	36	10	-	102
	SN	17	Bella Coola	517.1	-	-	-	-	1	3	6	8	-	18
			CFC	475.4	-	-	-	-	3	3	10	11	-	27
			Icicle	453.6	-	-	1	-	2	2	8	8	-	21
			All	1,446.1	7018.9	20.6	1	-	6	8	24	27	-	66
	Both	14, 17	All	2,656.3	12245.4	21.7	4	1	33	33	60	37	-	168

Table 1 (continued).

Region	Gear	Area	Fish Plant	Catch (mt) Searched	Total Catch (mt)	% Catch Searched	CWT Recoveries by Release Year 1999	BYD	2000	2001	2002	2003	2004	All
WCVI	GN	25	Bella Coola	84.4	-	-	-	-	-	-	-	-	18	18
			CFC	0.0	-	-	-	-	-	-	-	-	-	-
			Icicle	0.0	-	-	-	-	-	-	-	-	-	-
			All	84.4	593.3	14.2	-	-	-	-	-	-	18	18
WCVI	SN	25	Bella Coola	625.1	-	-	-	-	-	-	1	2	-	3
			CFC	381.0	-	-	-	-	-	-	-	1	-	1
			Icicle	606.0	-	-	-	-	-	-	2	3	2	7
			All	1,612.1	3861.2	41.8	-	-	-	-	3	6	2	11
	Both	25	All	1,696.5	4454.5	38.1	-	-	-	-	3	6	20	29
By plant			Bella Coola	2,103.8	-	-	-	1	2	63	210	315	18	609
			CFC	1,805.3	-	-	2	0	17	41	100	155	-	315
			Icicle	2,225.4	-	-	2	0	15	40	111	158	2	328
BC	GN	All	All	1,735.5	8012.0	21.7	3	1	27	119	187	29	18	384
	SN	All	All	4,399.0	15776.4	27.9	1		7	25	234	599	2	868
	Both	All	All	6,134.5	23788.4	25.8	4	1	34	144	421	628	20	1252

* Most of the SG gillnet catch was taken from Area 17 but an estimated 1316 mt were taken from Area 14.

Table 2. Summary of 2004 CWT recoveries by stock assessment region, statistical area and fishing gear relative to releases. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	1	2	-	-	3
	SG	17	14,266	-	-	-	-	-	-	-	-
1999 WYD	SG	14 or 17	5,815	-	-	-	-	1	-	-	1
1999/2000 BYD	SG	14 or 17	7,141	-	-	-	-	1	-	-	1
2000	SG	14	180,229	-	-	1	4	18	-	-	23
	SG	17	58,994	-	-	-	1	7	-	-	8
2000 WYD	SG	14 or 17	6,471	-	-	-	1	2	-	-	3
2001	PRD	4	65,809	82	3	1	-	-	-	-	86
	PRD	5	22,387	12	10	2	-	-	-	-	24
	SG	14	60,558	-	-	1	8	25	-	-	34
2002	PRD	4	48,960	128	3	1	-	-	-	1	133
	PRD	5	25,701	19	27	5	-	-	-	-	51
	PRD	5 WI	11,081	3	7	1	-	-	-	-	11
	CC	6	18,168	1	2	20	-	-	-	-	23
	CC	7	31,027	-	-	135	1	2	-	-	138
	CC	8	9,463	-	-	6	1	-	-	-	7
	SG	14	83,528	-	-	-	22	34	-	2	58

Table 2 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,512.1	6,134.5
	Catch searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
2003	PRD	4	15,066	5	4	-	-	-	-	-	9
	PRD	5	96,434	14	78	9	-	-	-	-	101
	CC	7*	79,920	-	1	435	1	2	-	-	439
	CC	8	27,453	-	-	28	-	-	-	-	28
	CC	9	13,660	-	-	11	-	-	-	1	12
	SG	14	89,247	-	-	-	26	8	-	5	39
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52049	-	-	-	-	-	-	-	-
	CC	7	107,843	-	-	-	-	-	-	-	-
	CC	8	45,040	-	-	-	-	-	-	-	-
	CC	9	17,770	-	-	-	-	-	-	-	-
	WCVI	23	33,608	-	-	-	-	-	-	-	-
	WCVI	24	32,421	-	-	-	-	-	-	-	-
	WCVI	25	41,434	-	-	-	-	-	15	-	15
	WCVI	26	27,181	-	-	-	-	-	3	2	5
All	All		1,364,729	264	135	656	66	102	18	11	1,252

WI refers to Wilson Inlet release event (southern PRD).

* Correction from Flostrand and Schweigert (2004) Tables 2 to 6 where the sum for 2003 CC Area 7 releases was printed as 78,229, and the 1999 to 2003 cumulative release total was printed as 1,005,692 when in fact it was 1,007,383.

Table 3. Estimates of 2004 CWT recovery rates (percentage of the released tags recovered) by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	<0.01	0.01	-	-	0.01
	SG	17	14,266	-	-	-	-	-	-	-	-
1999 WYD	SG	14 or 17	5,815	-	-	-	-	0.02	-	-	0.02
1999/2000 BYD	SG	14 or 17	7,141	-	-	-	-	0.01	-	-	0.01
2000	SG	14	180,229	-	-	<0.01	<0.01	0.01	-	-	0.01
	SG	17	58,994	-	-	-	<0.01	0.01	-	-	0.01
2000 WYD	SG	14 or 17	6,471	-	-	-	0.02	0.03	-	-	0.05
2001	PRD	4	65,809	0.12	<0.01	<0.01	-	-	-	-	0.13
	PRD	5	22,387	0.05	0.04	0.01	-	-	-	-	0.11
	SG	14	60,558	-	-	<0.01	0.01	0.04	-	-	0.06
2002	PRD	4	48,960	0.26	0.01	<0.01	-	-	-	<0.01	0.27
	PRD	5	25,701	0.07	0.11	0.02	-	-	-	-	0.20
	PRD	5 WI	11,081	0.03	0.06	0.01	-	-	-	-	0.10
	CC	6	18,168	0.01	0.01	0.11	-	-	-	-	0.13
	CC	7	31,027	-	-	0.44	0.00	0.01	-	-	0.44
	CC	8	9,463	-	-	0.06	0.01	-	-	-	0.07
	SG	14	83,528	-	-	-	0.03	0.04	-	<0.01	0.07

Table 3 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
2003	PRD	4	15,066	0.03	0.03	-	-	-	-	-	0.06
	PRD	5	96,434	0.01	0.08	0.01	-	-	-	-	0.10
	CC	7	79,920	-	<0.01	0.54	<0.01	<0.01	-	-	0.55
	CC	8	27,453	-	-	0.10	-	-	-	-	0.10
	CC	9	13,660	-	-	0.08	-	-	-	0.01	0.09
	SG	14	89,247	-	-	-	0.03	0.01	-	0.01	0.04
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52049	-	-	-	-	-	-	-	-
	CC	7	107,843	-	-	-	-	-	-	-	-
	CC	8	45,040	-	-	-	-	-	-	-	-
	CC	9	17,770	-	-	-	-	-	-	-	-
	WCVI	23	33,608	-	-	-	-	-	-	-	-
	WCVI	24	32,421	-	-	-	-	-	-	-	-
	WCVI	25	41,434	-	-	-	-	-	0.04	-	0.04
	WCVI	26	27,181	-	-	-	-	-	0.01	0.01	0.02

WI refers to Wilson Inlet release event (southern PRD).

Table 4. Estimates of 2004 tag densities (CWTs recovered per tonne of roe herring searched) by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	0.001	0.002	-	-	0.002
	SG	17	14,266	-	-	-	-	-	-	-	-
1999 WYD	SG	14 or 17	5,815	-	-	-	-	0.001	-	-	0.001
1999/2000 BYD	SG	14 or 17	7,141	-	-	-	-	0.001	-	-	0.001
2000	SG	14	180,229	-	-	0.001	0.003	0.015	-	-	0.018
	SG	17	58,994	-	-	-	0.001	0.006	-	-	0.006
2000 WYD	SG	14 or 17	6,471	-	-	-	0.001	0.002	-	-	0.002
2001	PRD	4	65,809	0.186	0.023	0.001	-	-	-	-	0.210
	PRD	5	22,387	0.027	0.076	0.002	-	-	-	-	0.105
	SG	14	60,558	-	-	0.001	0.006	0.021	-	-	0.027
2002	PRD	4	48,960	0.290	0.023	0.001	-	-	-	0.001	0.315
	PRD	5	25,701	0.043	0.205	0.004	-	-	-	-	0.253
	PRD	5 WI	11,081	0.007	0.053	0.001	-	-	-	-	0.061
	CC	6	18,168	0.002	0.015	0.017	-	-	-	-	0.034
	CC	7	31,027	-	-	0.112	0.001	0.002	-	-	0.114
	CC	8	9,463	-	-	0.005	0.001	-	-	-	0.006
	SG	14	83,528	-	-	-	0.015	0.028	-	0.001	0.045

Table 4 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
2003	PRD	4	15,066	0.011	0.030	-	-	-	-	-	0.042
	PRD	5	96,434	0.032	0.593	0.007	-	-	-	-	0.632
	CC	7	79,920	-	0.008	0.360	0.001	0.002	-	-	0.370
	CC	8	27,453	-	-	0.023	-	-	-	-	0.023
	CC	9	13,660	-	-	0.009	-	-	-	0.001	0.010
	SG	14	89,247	-	-	-	0.018	0.007	-	0.003	0.028
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52049	-	-	-	-	-	-	-	-
	CC	7	107,843	-	-	-	-	-	-	-	-
	CC	8	45,040	-	-	-	-	-	-	-	-
	CC	9	17,770	-	-	-	-	-	-	-	-
	WCVI	23	33,608	-	-	-	-	-	-	-	-
	WCVI	24	32,421	-	-	-	-	-	-	-	-
	WCVI	25	41,434	-	-	-	-	-	0.178	-	0.178
	WCVI	26	27,181	-	-	-	-	-	0.036	0.001	0.037
All	All			0.599	1.027	0.542	0.046	0.084	0.213	0.007	0.204

WI refers to Wilson Inlet release event (southern PRD).

Table 5. Estimates of 2004 CWT removals by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	5	9	-	-	14
	SG	17	14,266	-	-	-	-	-	-	-	-
1999 WYD	SG	14 or 17	5,815	-	-	-	-	4	-	-	4
1999/2000 BYD	SG	14 or 17	7,141	-	-	-	-	4	-	-	4
2000	SG	14	180,229	-	-	3	19	78	-	-	100
	SG	17	58,994	-	-	-	5	30	-	-	35
2000 WYD	SG	14 or 17	6,471	-	-	-	5	9	-	-	14
2001	PRD	4	65,809	408	44	2	-	-	-	-	454
	PRD	5	22,387	60	145	5	-	-	-	-	210
	SG	14	60,558	-	-	2	39	108	-	-	149
2002	PRD	4	48,960	636	44	2	-	-	-	2	684
	PRD	5	25,701	94	392	12	-	-	-	-	498
	PRD	5 WI	11,081	15	102	2	-	-	-	-	119
	CC	6	18,168	5	29	49	-	-	-	-	83
	CC	7	31,027	-	-	334	5	9	-	-	348
	CC	8	9,463	-	-	15	5	-	-	-	20
	SG	14	83,528	-	-	-	107	147	-	5	259

Table 5 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
2003	PRD	4	15,066	25	58	-	-	-	-	-	83
	PRD	5	96,434	70	1132	22	-	-	-	-	1224
	CC	7	79,920	-	15	1075	5	9	-	-	1104
	CC	8	27,453	-	-	69	-	-	-	-	69
	CC	9	13,660	-	-	27	-	-	-	2	29
	SG	14	89,247	-	-	-	126	35	-	12	173
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52049	-	-	-	-	-	-	-	-
	CC	7	107,843	-	-	-	-	-	-	-	-
	CC	8	45,040	-	-	-	-	-	-	-	-
	CC	9	17,770	-	-	-	-	-	-	-	-
	WCVI	23	33,608	-	-	-	-	-	-	-	-
	WCVI	24	32,421	-	-	-	-	-	-	-	-
	WCVI	25	41,434	-	-	-	-	-	105	-	105
	WCVI	26	27,181	-	-	-	-	-	21	5	26
All	All			1313	1959	1621	320	442	127	26	5808

WI refers to Wilson Inlet release event (southern PRD).

Table 6. Estimates of 2004 CWT removal rates (percentage of the released tag removed) from all roe herring catches by stock assessment region, statistical area and fishing gear. Total catch, catch tonnage and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8
Release Year	Region	Area	Tags Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	0.02	0.04	-	-	0.06
	SG	17	14,266	-	-	-	-	-	-	-	<0.01
1999 WYD	SG	14 or 17	5,815	-	-	-	-	0.07	-	-	0.07
1999/2000 BYD	SG	14 or 17	7,141	-	-	-	-	0.06	-	-	0.06
2000	SG	14	180,229	-	-	<0.01	0.01	0.04	-	-	0.05
	SG	17	58,994	-	-	-	0.01	0.05	-	-	0.06
2000 WYD	SG	14 or 17	6,471	-	-	-	0.08	0.13	-	-	0.21
2001	PRD	4	65,809	0.62	0.07	<0.01	-	-	-	-	0.69
	PRD	5	22,387	0.27	0.65	0.02	-	-	-	-	0.94
	SG	14	60,558	<0.01	<0.01	<0.01	0.06	0.18	-	-	0.25
2002	PRD	4	48,960	1.30	0.09	0.01	-	-	-	<0.01	1.39
	PRD	5	25,701	0.37	1.52	0.05	-	-	-	-	1.94
	PRD	5 WI	11,081	0.13	0.92	0.02	-	-	-	-	1.07
	CC	6	18,168	0.03	0.16	0.27	-	-	-	-	0.46
	CC	7	31,027	-	-	1.08	0.02	0.03	-	-	1.12
	CC	8	9,463	-	-	0.16	0.05	-	-	-	0.21
	SG	14	83,528	-	-	-	0.13	0.18	-	0.01	0.31

Table 6 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	17	14,17	25	25	
	Gear			GN	SN	SN	SN	GN	GN	SN	
	Total Catch (mt)			2,192.2	1,908.5	2,987.8	7,018.9	5,226.5	593.3	3,861.2	23,788.4
	Tonnage Searched (mt)			440.9	131.5	1,209.3	1,446.1	1,210.2	84.4	1,612.1	6,134.5
	Catch Searched (%)			20.1	6.9	40.5	20.6	23.2	14.2	41.8	25.8%
Release Year	Region	Area	Tags Released								
2003	PRD	4	15,066	0.17	0.39	-	-	-	-	-	0.55
	PRD	5	96,434	0.07	1.17	0.02	-	-	-	-	1.27
	CC	7	79,920	-	0.02	1.34	0.01	0.01	-	-	1.38
	CC	8	27,453	-	-	0.25	-	-	-	-	0.25
	CC	9	13,660	-	-	0.20	-	-	-	0.02	0.22
	SG	14	89,247	-	-	-	0.14	0.04	-	0.01	0.19
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52,049	-	-	-	-	-	-	-	-
	CC	7	107,843	-	-	-	-	-	-	-	-
	CC	8	45,040	-	-	-	-	-	-	-	-
	CC	9	17,770	-	-	-	-	-	-	-	-
	WCVI	23	33,608	-	-	-	-	-	-	-	-
	WCVI	24	32,421	-	-	-	-	-	-	-	-
	WCVI	25	41,434	-	-	-	-	-	0.25	-	0.25
	WCVI	26	27,181	-	-	-	-	-	0.08	0.02	0.10

WI refers to Wilson Inlet release event (southern PRD).

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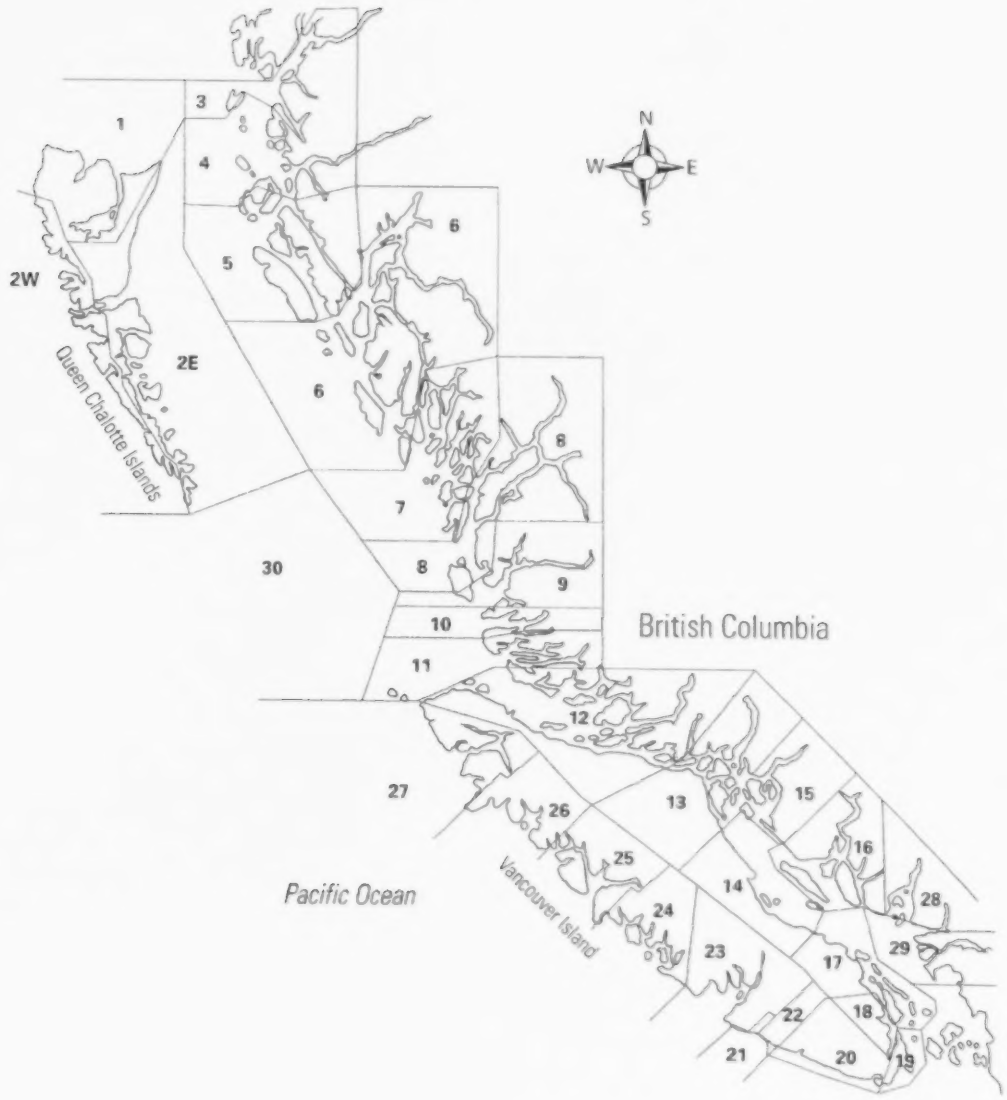

Figure 1. The coast of British Columbia, shown divided into representative inshore fisheries statistical (management) areas.

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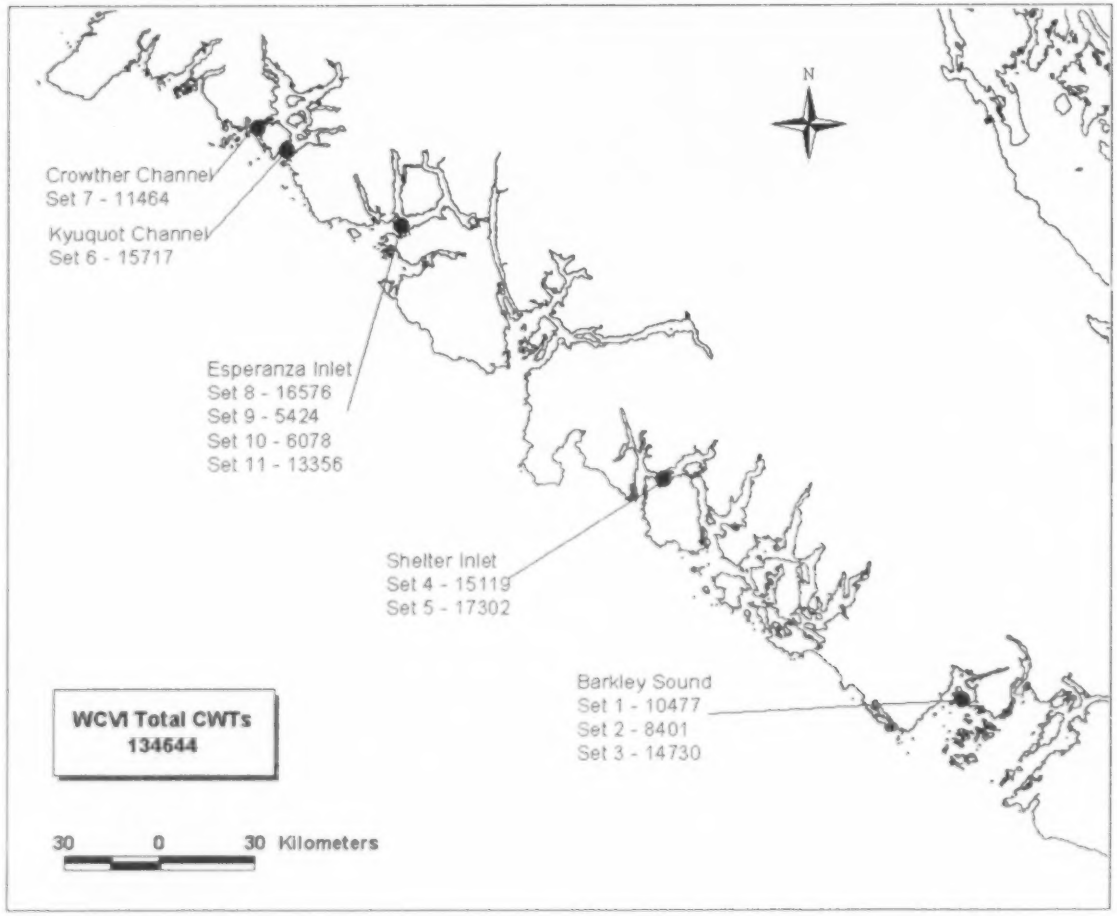

Figure 2. Tag releases by location and set number in the west coast of Vancouver Island in 2004.

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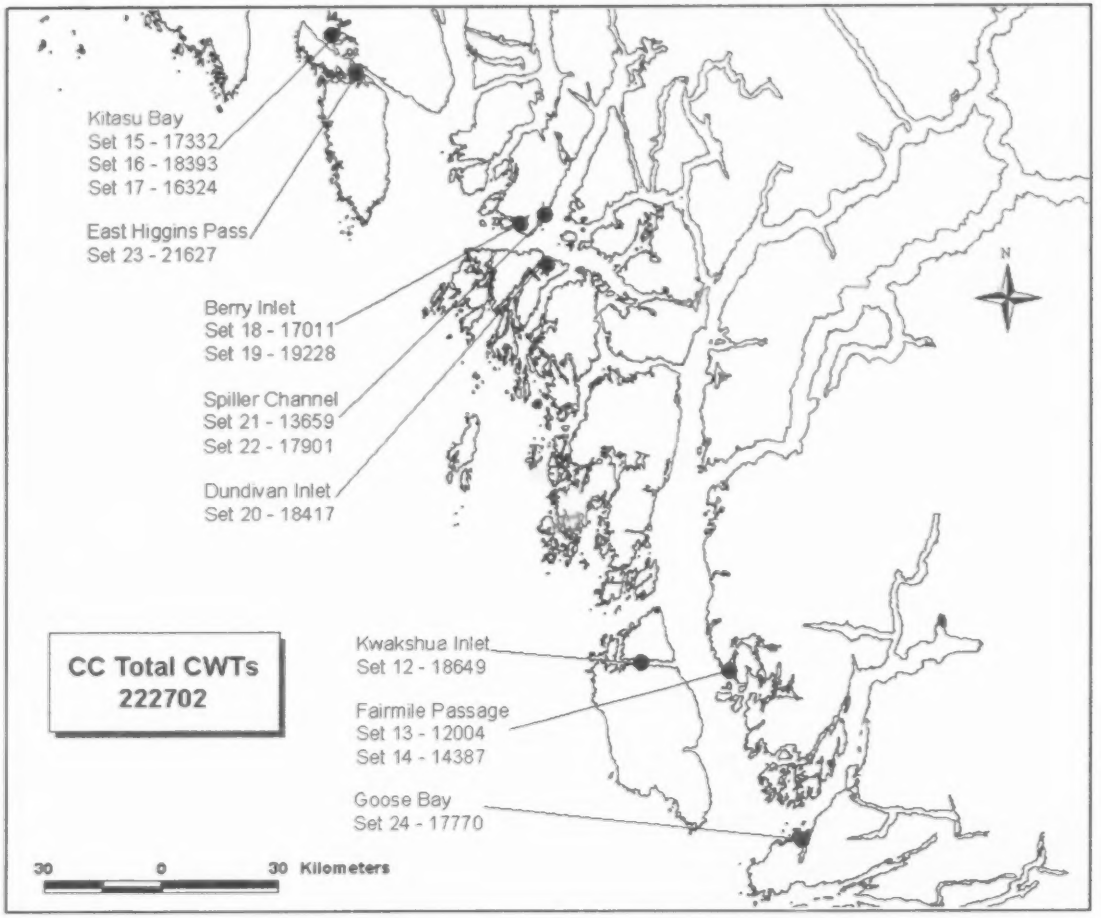

Figure 3. Tag releases by location and set number in the Central Coast in 2004

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Appendix A. Summary of fishing information related to herring tagging sessions conducted in 2004.

Location	Area	Date	Set	Latitude		Longitude		PST	Hours	Conditions	Spawning Observations	Predation
West Coast of Vancouver Island												
SE Spilling Islets	23-10	4-Mar-04	1	48	58.83	125	22.05	17:45	3.0	mild, chop	in vicinity	sea lions
Mayne Bay	23-9	6-Mar-04	2	48	58.67	125	18.91	9:14	2.0	mild, calm	in vicinity	1 sea lion
St. Ines Island	23-9	7-Mar-04	3	48	58.84	125	22.04	8:02	4.0	mild, calm	in vicinity	sea gulls
Shelter Inlet	24-3	10-Mar-04	4	49	23.52	126	12.36	15:45	3.8	mild, calm	no sign while tagging	sea gulls
Shelter Inlet	24-3	11-Mar-04	5	49	23.65	126	12.39	6:10	4.5	mild, calm	no sign while tagging	sea gulls
Kyuquot Channel	26-2	13-Mar-04	6	49	59.22	127	13.27	9:02	4.0	mild, chop	no sign while tagging	none observed
Crowther Channel	26-1	13-Mar-04	7	50	1.54	127	19.59	10:48	2.8	mild, chop	no sign while tagging	none observed
Rosa Harbour	25-13	15-Mar-04	8	49	50.22	126	57.81	12:00	4.0	mild, calm	light spawn in spots	none observed
Rosa Harbour	25-13	16-Mar-04	9	49	50.38	126	56.98	17:20	2.0	mild, calm	lots of spawning in area	none observed
Rosa Harbour	25-13	17-Mar-04	10	49	50.18	126	58.18	5:47	1.5	mild, calm	lots of spawning in area	none observed
Rosa Harbour	25-13	17-Mar-04	11	49	50.11	126	58.15	8:21	4.0	mild, calm	lots of spawning in area	none observed
Central Coast												
Pruth Bay	8-2	21-Mar-04	12	51	39.32	128	7.18	9:51	4.5	mild, calm	no sign while tagging	none observed
Fairmile Passage	8-16	21-Mar-04	13	51	37.78	127	49.47	19:45	3.0	mild, chop	no sign while tagging	none observed
Fairmile Passage	8-16	22-Mar-04	14	51	37.41	127	48.91	8:05	3.4	mild, calm	no sign while tagging	none observed
Kitasu Bay	6-18	24-Mar-04	15	52	31.00	128	44.45	5:45	4.5	mild, chop	in vicinity	sea gulls
Kitasu Bay	6-18	24-Mar-04	16	52	31.26	128	44.68	13:00	4.3	mild, chop	in vicinity	sea gulls
Kitasu Bay	6-18	25-Mar-04	17	52	31.09	128	44.75	6:30	3.8	mild, calm	in vicinity	sea gulls
Berry Inlet	7-8	25-Mar-04	18	52	16.22	128	19.13	16:50	3.8	mild, calm	no sign while tagging	none observed
Berry Inlet	7-8	26-Mar-04	19	52	16.36	128	18.97	7:45	4.5	mild, calm	no sign while tagging	none observed
Dundivan Inlet	7-22	27-Mar-04	20	52	13.18	128	15.59	5:35	3.8	mild, chop	no sign while tagging	none observed
Tankeeah River	7-13	27-Mar-04	21	52	18.79	128	14.03	15:15	3.0	mild, chop	no sign while tagging	none observed
Tankeeah River	7-13	28-Mar-04	22	52	17.13	128	15.68	8:00	3.8	mild, chop	no sign while tagging	sea gulls
East Higgins Pass	7-3	30-Mar-04	23	52	29.41	128	41.96	5:15	4.5	cold, calm	no sign while tagging	none observed
Goose Bay	9-2	31-Mar-04	24	51	23.09	127	39.70	5:50	4.0	cold, chop	no sign while tagging	none observed

Appendix B. Summary of 1999 to 2004 herring releases with binary tag code discrepancies and subsequent 2004 tag recoveries.

Discrepancy Type	Release Year	Tagging Set	Area	Tag Code	Releases	Recoveries
Within-year[a]	1999	13	14	18-12-13	3,310	0
	1999	12	17	18-12-32	2,505	1
	2000	5	14	02-13-12	3,017	0
	2000	25	17	18-14-43	3,454	4
	2000	14, 15	14	18-12-19	2,506	0
	2000	21	14	02-12-12	9,108	0
	2000	11	14	18-03-34	6,356	0
	2000	16, 17	14	18-42-17	7,030	0
	2000	26, 27	17	18-34-42	511	0
	2000	19	14	18-42-23	0	0
	2000	13	14	18-34-35	2,024	0
	2000	13	14	18-34-45	0	0
	2000	27	17	18-31-11	3,312	0
	2000	27	17	18-31-10	3,060	0
	2004	9	25	18-45-39	2,833	0
	2004	12	8	18-45-39	426	0
		Total		15 codes	49,452	5
Between-years[b]	1999	1	14	18-08-48	2,587	
	2000	30	17		952	
				Subtotal	3,539	
	1999	3	14	18-15-63	1,857	1
	2000	23, 24	17		1,745	
				Subtotal	3,602	
		Total		2 codes	7,141	1

[a] Tag code mislabelling occurred between codes used within the same year and stock region.
[b] Accidental repeated tag code usage occurred with 1999 and 2000 Strait of Georgia releases.

Appendix C. Summary of herring CWT releases from 1999 to 2004 by set identification code (year and set number), stock assessment region, statistical area, location, date, code discrepancy (Disc), number of tagged herring released and subsequent 2004 tag recoveries.

Set Id [a]	Region	Area	Location	Date	Disc[b]	Releases	Recoveries
1999-001	SOG	14	Fillongley Park	02/03/1999	BYD	3,539	
1999-002	SOG	14	Whalebone Point	04/03/1999		3,751	
1999-003	SOG	14	Phipps Point	04/03/1999	BYD	3,602	1
1999-004	SOG	14	Bowser	05/03/1999		3,006	1
1999-005	SOG	14	Qualicum Bay	06/03/1999		3,590	1
1999-006	SOG	14	Qualicum Bay	06/03/1999		3,670	
1999-007	SOG	14	Metcalfe Bay	07/03/1999		675	
1999-008	SOG	14	Chrome Island	09/03/1999		1,644	
1999-009	SOG	17	Link Island	15/03/1999		1,964	
1999-010	SOG	17	Jesse Island	15/03/1999		3,597	
1999-011	SOG	17	McKay Point	16/03/1999		3,370	
1999-012	SOG	17	Link Island	18/03/1999		913	
1999-012	SOG	17	Link Island	18/03/1999	WYD	2,505	1
1999-013	SOG	14	French Creek	18/03/1999	WYD	3,310	
1999-014	SOG	14	French Creek	19/03/1999		3,438	
1999-015	SOG	14	French Creek	19/03/1999		3,413	1
1999-016	SOG	17	Link Island	20/03/1999		4,422	
1999-017	QCI	2E	Wanderer Island	26/03/1999		1,141	
1999-018	QCI	2E	Wanderer Island	27/03/1999		2,002	
1999-019	QCI	2E	Wanderer Island	28/03/1999		3,032	
2000-001	SOG	14	Fillongley Park	26/02/2000		18,963	2
2000-003	SOG	14	Fillongley Park	27/02/2000		13,472	1
2000-004	SOG	14	Big Qualicum	29/02/2000		13,304	2
2000-005	SOG	14	Boyle Point	03/03/2000	WYD	6,471	3
2000-005	SOG	14	Boyle Point	03/03/2000		4,809	
2000-006	SOG	14	Boyle Point	03/03/2000		15,489	2
2000-007	SOG	14	Repulse Point	03/03/2000		13,180	
2000-009	SOG	14	Tribune Bay	05/03/2000		16,100	2
2000-011	SOG	14	Helliwell Park	06/03/2000		13,386	3
2000-012	SOG	14	Qualicum Bay	06/03/2000		4,750	
2000-013	SOG	14	Parksville Bay	07/03/2000		7,963	1
2000-014	SOG	14	Parksville Bay	07/03/2000		18,379	8
2000-015	SOG	14	Parksville Bay	07/03/2000		5,936	
2000-016	SOG	14	French Creek	08/03/2000		2,109	
2000-017	SOG	14	French Creek	08/03/2000		1,576	
2000-018	SOG	14	French Creek	08/03/2000		9,662	2
2000-019	SOG	14	Longbeak Point	09/03/2000	WYD	511	
2000-019	SOG	14	Longbeak Point	09/03/2000		10,358	
2000-020	SOG	14	Longbeak Point	09/03/2000		8,623	
2000-021	SOG	14	Northwest Bay	11/03/2000		1,659	
2000-022	SOG	17	Yellow Point	14/03/2000		8,258	1
2000-023	SOG	17	Link Island	14/03/2000		5,651	1
2000-025	SOG	17	Yellow Point	15/03/2000		3,426	1
2000-026	SOG	17	Link Island	16/03/2000		7,074	2
2000-027	SOG	17	Hammond Bay	20/03/2000		10,035	
2000-028	SOG	17	Mudge Island	21/03/2000		4,235	2

Appendix C (continued).

Set Id [a]	Region	Area	Location	Date	Disc[b]	Releases	Recoveries
2000-029	SOG	17	Richard Point	22/03/2000		5,715	
2000-030	SOG	17	Blunden Point	22/03/2000		4,517	
2000-031	SOG	17	Icarus Point	23/03/2000		4,430	
2000-032	SOG	17	Schooner Cove	24/03/2000		5,653	1
2001-001	SOG	14	Bowser	04/03/2001		8,457	4
2001-003	SOG	14	Bowser	04/03/2001		3,717	2
2001-004	SOG	14	Bowser	05/03/2001		3,113	1
2001-005	SOG	14	Cape Lazo	05/03/2001		7,016	6
2001-006	SOG	14	Cape Lazo	06/03/2001		8,090	6
2001-007	SOG	14	Cape Lazo	06/03/2001		6,486	1
2001-009	SOG	14	Lambert Channel	07/03/2001		9,102	6
2001-012	SOG	14	Little Qualicum River	08/03/2001		7,204	5
2001-013	SOG	14	Qualicum Bay	08/03/2001		2,798	1
2001-016	SOG	14	French Creek	10/03/2001		4,575	2
2001-018	PRD	5	Kitkatla Inlet	22/03/2001		6,470	8
2001-019	PRD	5	Kitkatla Inlet	22/03/2001		1,946	2
2001-020	PRD	5	Kitkatla Inlet	22/03/2001		1,396	
2001-021	PRD	5	Kitkatla Inlet	23/03/2001		8,275	10
2001-023	PRD	5	Kitkatla Inlet	24/03/2001		4,300	4
2001-024	PRD	4	Casey Cove	28/03/2001		4,170	9
2001-025	PRD	4	Metford Island	28/03/2001		6,708	8
2001-026	PRD	4	Garden Island	29/03/2001		7,443	10
2001-027	PRD	4	Garden Island	30/03/2001		5,338	7
2001-028	PRD	4	Venn Pass	31/03/2001		6,384	8
2001-029	PRD	4	Venn Pass	31/03/2001		6,320	10
2001-030	PRD	4	Big Bay	31/03/2001		6,129	14
2001-031	PRD	4	Venn Pass	01/04/2001		12,508	10
2001-033	PRD	4	Venn Pass	02/04/2001		8,839	9
2001-035	PRD	4	Garden Island	02/04/2001		1,970	1
2002-001	SOG	14	Norris Rock	05/03/2002		3,908	1
2002-002	SOG	14	Gartley Point	06/03/2002		5,585	3
2002-003	SOG	14	Comox Bar	06/03/2002		4,123	4
2002-004	SOG	14	Seal Islets	08/03/2002		9,088	9
2002-005	SOG	14	Longbeak Point	08/03/2002		7,339	12
2002-006	SOG	14	Sandy Island	11/03/2002		10,345	8
2002-007	SOG	14	Comox Bar	11/03/2002		2,241	4
2002-008	SOG	14	Repulse Point	15/03/2002		2,695	1
2002-009	SOG	14	Gravelly Bay	15/03/2002		6,950	1
2002-010	SOG	14	French Creek	16/03/2002		4,002	6
2002-011	SOG	14	French Creek	17/03/2002		8,248	1
2002-012	SOG	14	Shingle Spit	17/03/2002		10,738	5
2002-013	SOG	14	Comox Bar	19/03/2002		8,266	3
2002-014	CC	8	Pruth Bay	20/03/2002		1,771	4
2002-015	CC	8	Pruth Bay	21/03/2002		7,692	3
2002-016	CC	7	Norman Morrison Bay	21/03/2002		7,772	28
2002-017	CC	7	Berry Inlet	22/03/2002		8,359	49
2002-018	CC	7	Lockhart Bay	22/03/2002		7,161	33
2002-019	CC	7	Spiller Channel	23/03/2002		7,735	28
2002-020	CC	6	Kitasu Bay	24/03/2002		9,042	13

Appendix C (continued).

Set Id [a]	Region	Area	Location	Date	Disc[b]	Releases	Recoveries
2002-021	CC	6	Kitasu Bay	25/03/2002		9,126	10
2002-022	PRD	4	Swallow Island	26/03/2002		5,936	15
2002-023	PRD	4	Shattock Point	27/03/2002		8,186	29
2002-024	PRD	4	Shattock Point	27/03/2002		6,895	14
2002-025	PRD	4	Shattock Point	27/03/2002		6,933	19
2002-026	PRD	4	Anchor Shoal	28/03/2002		8,324	17
2002-027	PRD	4	Simpson Point	28/03/2002		8,126	25
2002-028	PRD	4	Whitecliff Island	28/03/2002		4,560	14
2002-029	PRD	5	Robert Island	31/03/2002		8,119	23
2002-030	PRD	5	Robert Island	01/04/2002		5,899	16
2002-031	PRD	5	Willis Bay	01/04/2002		2,651	6
2002-032	PRD	5	Willis Bay	01/04/2002		7,255	6
2002-033	PRD	5	Willis Bay	02/04/2002		1,777	
2002-034	PRD	5WI	Wilson Inlet	02/04/2002		11,081	11
2003-001	SOG	16	Secret Cove	05/03/2003		6,643	
2003-002	SOG	14	Madrona Point	07/03/2003		12,701	9
2003-003	SOG	14	Madrona Point	07/03/2003		3,903	6
2003-004	SOG	14	Mistaken Island	10/03/2003		11,433	7
2003-005	SOG	14	Brant Point	11/03/2003		1,203	1
2003-006	SOG	14	Brant Point	11/03/2003		3,907	1
2003-007	SOG	14	Baynes Sound	16/03/2003		11,272	5
2003-008	SOG	14	Longbeak Point	16/03/2003		12,351	7
2003-009	SOG	14	Longbeak Point	16/03/2003		8,337	1
2003-010	SOG	14	Chrome Island	17/03/2003		11,372	1
2003-011	SOG	14	Repulse Point	17/03/2003		12,768	1
2003-012	CC	9	Goose Bay	20/03/2003		13,660	12
2003-013	CC	8	Storm Inlet	20/03/2003		15,423	16
2003-014	CC	8	Pruth Bay	21/03/2003		12,030	12
2003-015	CC	7	Kildidt Sound	22/03/2003		9,132	36
2003-016	CC	7	Lockhart Bay	23/03/2003		13,542	108
2003-017	CC	7	SW Spiller Channel	23/03/2003		13,594	117
2003-018	CC	7	Neekas Inlet	24/03/2003		16,394	77
2003-019	CC	7	Berry Inlet	24/03/2003		11,739	74
2003-020	CC	7	East Higgins Pass	25/03/2003		15,519	27
2003-021	PRD	5	Gurd Point	27/03/2003		14,095	24
2003-022	PRD	5	Gurd Island (Nth)	27/03/2003		14,092	22
2003-023	PRD	5	Dries Inlet	27/03/2003		9,403	13
2003-024	PRD	4	Cunningham Pass	31/03/2003		15,066	9
2003-025	PRD	5	Robert Island	01/04/2003		15,291	12
2003-026	PRD	5	Kitkatla Inlet	01/04/2003		14,379	7
2003-027	PRD	5	Porcher Peninsula	02/04/2003		15,465	13
2003-028	PRD	5	Gurd Point	02/04/2003		13,709	10
2004-001	WCVI	23	SE Spilling Islets	04/03/2004		10,477	
2004-002	WCVI	23	Mayne Bay	06/03/2004		8,401	
2004-003	WCVI	23	Saint Ines Island	07/03/2004		14,730	
2004-004	WCVI	24	Shelter Inlet	10/03/2004		15,119	
2004-005	WCVI	24	Shelter Inlet	11/03/2004		17,302	
2004-006	WCVI	26	Kyuquot Channel	13/03/2004		15,717	5

Appendix C (continued).

Set Id [a]	Region	Area	Location	Date	Disc[b]	Releases	Recoveries
2004-007	WCVI	26	Crowther Channel	13/03/2004		11,464	
2004-008	WCVI	25	Rosa Harbour	15/03/2004		16,576	15
2004-009	WCVI	25	Rosa Harbour	16/03/2004		2,591	
2004-009	WCVI	25	Rosa Harbour	16/03/2004	WYD	2,833	
2004-010	WCVI	25	Rosa Harbour	17/03/2004		6,078	
2004-011	WCVI	25	Rosa Harbour	17/03/2004		13,356	
2004-012	CC	8	Pruth Bay	21/03/2004	WYD	426	
2004-012	CC	8	Pruth Bay	21/03/2004		18,223	
2004-013	CC	8	Fairmile Passage	21/03/2004		12,004	
2004-014	CC	8	Fairmile Passage	22/03/2004		14,387	
2004-015	CC	6	Kitasu Bay	24/03/2004		17,332	
2004-016	CC	6	Kitasu Bay	24/03/2004		18,393	
2004-017	CC	6	Kitasu Bay	25/03/2004		16,324	
2004-018	CC	7	Berry Inlet	25/03/2004		17,011	
2004-019	CC	7	Berry Inlet	26/03/2004		19,228	
2004-020	CC	7	Dundivan Inlet	27/03/2004		18,417	
2004-021	CC	7	Tankeeah River	27/03/2004		13,659	
2004-022	CC	7	Tankeeah River	28/03/2004		17,901	
2004-023	CC	7	East Higgins Pass	30/03/2004		21,627	
2004-024	CC	9	Goose Bay	31/03/2004		17,770	
Totals						**1,364,729**	**1,252**

[a] Set Id refers to release year and set number for first use of tag code in cases where multiple use occurred.
[b] Disc indicates which sets had discrepant release information from multiple code use (Appendix B).

Appendix D. Summary of herring CWT 2003 releases by set identification (year and set number), stock assessment region, statistical area, location, interval sequence number, number of tagged herring released, subsequent 2004 tag recoveries and recovery rate (RR%).

Set Id	Region	Area	Location	Interval Sequence	Releases	Recoveries	RR%
2003-001	SOG	16	Secret Cove	1	3821	0	0.00
				2	2822	0	0.00
2003-002	SOG	14	Madrona Point	1	4282	4	0.09
				2	4236	0	0.00
				3	4183	5	0.12
2003-003	SOG	14	Madrona Point	1	3903	6	0.15
2003-004	SOG	14	Mistaken Island	1	3806	1	0.03
				2	3711	8	0.22
				3	3055	2	0.07
2003-005	SOG	14	Brant Point	1	1203	1	0.08
2003-006	SOG	14	Brant Point	1	3907	1	0.03
2003-007	SOG	14	Baynes Sound	1	4166	3	0.07
				2	4083	1	0.02
				3	3884	2	0.05
2003-008	SOG	14	Longbeak Point	1	3890	5	0.13
				2	4375	2	0.05
				3	4086	0	0.00
2003-009	SOG	14	Longbeak Point	1	3324	1	0.03
				2	5013	0	0.00
2003-010	SOG	14	Chrome Island	1	4169	1	0.02
				2	3352	0	0.00
				3	3851	0	0.00
2003-011	SOG	14	Repulse Point	1	4237	1	0.02
				2	4281	0	0.00
				3	4250	0	0.00
2003-012	CC	9	Goose Bay	1	4139	1	0.02
				2	3809	3	0.08
				3	3822	6	0.16
				4	1890	2	0.11
2003-013	CC	8	Storm Inlet	1	3916	6	0.15
				2	4393	6	0.14
				3	4338	3	0.07
				4	2776	1	0.04

Appendix D. (continued).

Set Id	Region	Area	Location	Interval Sequence	Releases	Recoveries	RR%
2003-014	CC	8	Pruth Bay	1	3667	7	0.19
				2	3722	3	0.08
				3	4641	2	0.04
2003-015	CC	7	Kildidt Sound	1	3654	12	0.33
				2	4021	16	0.40
2003-016	CC	7	Lockhart Bay	1	3866	46	1.19
				2	4163	31	0.74
				3	4309	38	0.88
				4	2661	20	0.75
2003-017	CC	7	SW Spiller Channel	1	3972	47	1.18
				2	5347	40	0.75
				3	4275	30	0.70
2003-018	CC	7	Neekas Inlet	1	5687	34	0.60
				2	5433	16	0.29
				3	4043	19	0.47
				4	1231	8	0.65
2003-019	CC	7	Berry Inlet off Spiller	1	4128	40	0.97
				2	5141	20	0.39
				3	2470	14	0.57
2003-020	CC	7	East Higgins Pass	1	4786	11	0.23
				2	5049	8	0.16
				3	3874	6	0.15
				4	1810	2	0.11
2003-021	PRD	5	Gurd Point	1	4062	8	0.20
				2	6194	11	0.18
				3	3839	5	0.13
2003-022	PRD	5	Gurd Island (Nth)	1	4389	6	0.14
				2	6184	11	0.18
				3	3519	5	0.14
2003-023	PRD	5	Dries Inlet	1	4859	8	0.16
				2	4544	5	0.11
2003-024	PRD	4	Cunningham Pass	1	4400	4	0.09
				2	6727	3	0.04
				3	3939	2	0.05

Appendix D (continued).

Set Id	Region	Area	Location	Interval Sequence	Releases	Recoveries	RR%
2003-025	PRD	5	Porcher Peninsula	1	4614	6	0.13
				2	6624	3	0.05
				3	4053	3	0.07
2003-026	PRD	5	Kitkatla Inlet	1	4755	3	0.06
				2	6222	3	0.05
				3	3402	1	0.03
2003-027	PRD	5	Porcher Peninsula	1	4621	4	0.09
				2	6310	3	0.05
				3	4534	6	0.13
2003-028	PRD	5	Gurd Point	1	4787	3	0.06
				2	6569	4	0.06
				3	2353	3	0.13
					328423	**626**	0.19